Supplemental materials:

Introduction:

Case reports of the 3q29 deletion, many of which are reviewed in¹, include²⁻²³.

Supplemental methods:

Neuroimaging Methods: MRI data were collected from a subset of study subjects (n=24) on a Siemens Magnetom Prisma 3T scanner at the Center for Systems Imaging Core using a 32-channel head coil. T1-weighted and T2-weighted high-resolution structural images were acquired. T1-weighted images were acquired using a 3D MPRAGE sequence with the following parameters: TE=2.24ms, TI=1000ms, TR=2400ms, flip angle=8°, matrix=320x320, FOV=256x256mm, 208 sagittal slices, 0.8mm isotropic resolution, bandwidth=210 Hz/pixel. A GRAPPA factor of 2 was used with no phase oversampling and two repetitions. The total scan duration was 13 minutes, 16 seconds. A 3D T2-weighted Sampling Perfection with Application optimized Contrast using different angle Evolutions (SPACE) sequence was collected with the following parameters: TE=563ms, TR=3200ms, bandwidth=745 Hz/pixel, FOV=256×240×256 mm³, sagittally acquired, 0.8mm isotropic resolution. A GRAPPA factor of 2 was used with no phase oversampling and two repetitions. The total scan duration was 11 minutes. Of the eight subjects who did not complete the MRI, two were at too low a developmental level to successfully complete the procedure, one declined to participate, and five were medically ineligible.

Supplemental results:

General Psychopathology:

In addition to the results reported in the text and Figure 2: two people met criteria for intermittent explosive disorder; two people met criteria for obsessive compulsive disorder; two people met criteria for major depressive disorder. For each of the following diagnoses, one person met criteria: oppositional defiant disorder, conduct disorder, Bipolar I disorder.

Supplemental acknowledgements: We acknowledge additional members of The Emory 3q29 Project: Hallie Averbach, Gary J. Bassell, Tamara Caspary, David Cutler, Paul A. Dawson, Henry R. Johnston, Bryan Mak, Tamika Malone, Trenell Mosley, Rebecca M. Pollak, Ryan Purcell, Nikisha Sisodoya, Steven Sloan, Stephen T. Warren, David Weinshenker, Zhexing Wen, and Michael E. Zwick.

Citations:

- 1. Cox DM, Butler MG. A clinical case report and literature review of the 3q29 microdeletion syndrome. Clinical dysmorphology. 2015;24(3):89-94. Epub 2015/02/26. doi: 10.1097/MCD.000000000000077. PubMed PMID: 25714563.
- 2. Ballif BC, Theisen A, Coppinger J, Gowans GC, Hersh JH, Madan-Khetarpal S, Schmidt KR, Tervo R, Escobar LF, Friedrich CA, McDonald M, Campbell L, Ming JE, Zackai EH, Bejjani BA, Shaffer LG. Expanding the clinical phenotype of the 3q29 microdeletion syndrome and characterization of the reciprocal microduplication. Molecular cytogenetics. 2008;1:8. Epub 2008/05/13. doi: 10.1186/1755-8166-1-8. PubMed PMID: 18471269; PMCID: 2408925.
- 3. Willatt L, Cox J, Barber J, Cabanas ED, Collins A, Donnai D, FitzPatrick DR, Maher E, Martin H, Parnau J, Pindar L, Ramsay J, Shaw-Smith C, Sistermans EA, Tettenborn M, Trump D, de Vries BB, Walker K, Raymond FL. 3q29 microdeletion syndrome: clinical and molecular characterization of a new syndrome. American journal of human genetics. 2005;77(1):154-60. Epub 2005/05/27. doi: 10.1086/431653. PubMed PMID: 15918153; PMCID: 1226188.
- 4. Cobb W, Anderson A, Turner C, Hoffman RD, Schonberg S, Levin SW. 1.3 Mb de novo deletion in chromosome band 3q29 associated with normal intelligence in a child. Eur J Med Genet. 2010;53(6):415-8. Epub 2010/09/14. doi: 10.1016/j.ejmg.2010.08.009. PubMed PMID: 20832509.
- 5. Baynam G, Goldblatt J, Townshend S. A case of 3q29 microdeletion with novel features and a review of cytogenetically visible terminal 3q deletions. Clinical dysmorphology. 2006;15(3):145-8. Epub 2006/06/09. doi: 10.1097/01.mcd.0000198934.55071.ee. PubMed PMID: 16760732.
- 6. Citta S, Buono S, Greco D, Barone C, Alfei E, Bulgheroni S, Usilla A, Pantaleoni C, Romano C. 3q29 microdeletion syndrome: Cognitive and behavioral phenotype in four patients. American journal of medical genetics Part A. 2013;161A(12):3018-22. Epub 2013/11/12. doi: 10.1002/ajmg.a.36142. PubMed PMID: 24214349.

- 7. Clayton-Smith J, Giblin C, Smith RA, Dunn C, Willatt L. Familial 3q29 microdeletion syndrome providing further evidence of involvement of the 3q29 region in bipolar disorder. Clinical dysmorphology. 2010;19(3):128-32. Epub 2010/05/11. doi: 10.1097/MCD.0b013e32833a1e3c. PubMed PMID: 20453639.
- 8. Dasouki MJ, Lushington GH, Hovanes K, Casey J, Gorre M. The 3q29 microdeletion syndrome: report of three new unrelated patients and in silico "RNA binding" analysis of the 3q29 region. American journal of medical genetics Part A. 2011;155A(7):1654-60. Epub 2011/06/01. doi: 10.1002/ajmg.a.34080. PubMed PMID: 21626679; PMCID: PMC3312009.
- 9. Digilio MC, Bernardini L, Mingarelli R, Capolino R, Capalbo A, Giuffrida MG, Versacci P, Novelli A, Dallapiccola B. 3q29 Microdeletion: a mental retardation disorder unassociated with a recognizable phenotype in two mother-daughter pairs. American journal of medical genetics Part A. 2009;149A(8):1777-81. Epub 2009/07/18. doi: 10.1002/ajmg.a.32965. PubMed PMID: 19610115.
- 10. Khan WA, Cohen N, Scott SA, Pereira EM. Familial inheritance of the 3q29 microdeletion syndrome: case report and review. BMC Med Genomics. 2019;12(1):51. Epub 2019/03/20. doi: 10.1186/s12920-019-0497-4. PubMed PMID: 30885185; PMCID: PMC6421695.
- 11. Monfort S, Rosello M, Orellana C, Oltra S, Blesa D, Kok K, Ferrer I, Cigudosa JC, Martinez F. Detection of known and novel genomic rearrangements by array based comparative genomic hybridisation: deletion of ZNF533 and duplication of CHARGE syndrome genes. J Med Genet. 2008;45(7):432-7. Epub 2008/04/17. doi: 10.1136/jmg.2008.057596. PubMed PMID: 18413373.
- 12. Li F, Lisi EC, Wohler ES, Hamosh A, Batista DA. 3q29 interstitial microdeletion syndrome: an inherited case associated with cardiac defect and normal cognition. Eur J Med Genet. 2009;52(5):349-52. Epub 2009/05/23. doi: 10.1016/j.ejmg.2009.05.001. PubMed PMID: 19460468.
- 13. Petrin AL, Daack-Hirsch S, L'Heureux J, Murray JC. A case of 3q29 microdeletion syndrome involving oral cleft inherited from a nonaffected mosaic parent: molecular analysis and ethical implications. Cleft Palate Craniofac J. 2011;48(2):222-30. Epub 2010/05/27. doi: 10.1597/09-149. PubMed PMID: 20500065; PMCID: PMC2964377.
- 14. Quintero-Rivera F, Sharifi-Hannauer P, Martinez-Agosto JA. Autistic and psychiatric findings associated with the 3q29 microdeletion syndrome: case report and review. American journal of medical genetics Part A. 2010;152A(10):2459-67. Epub 2010/09/11. doi: 10.1002/ajmg.a.33573. PubMed PMID: 20830797.

- 15. Sagar A, Bishop JR, Tessman DC, Guter S, Martin CL, Cook EH. Co-occurrence of autism, childhood psychosis, and intellectual disability associated with a de novo 3q29 microdeletion. American journal of medical genetics Part A. 2013;161A(4):845-9. Epub 2013/02/28. doi: 10.1002/ajmg.a.35754. PubMed PMID: 23443968; PMCID: 3685481.
- 16. Tyshchenko N, Hackmann K, Gerlach EM, Neuhann T, Schrock E, Tinschert S. 1.6Mb deletion in chromosome band 3q29 associated with eye abnormalities. Eur J Med Genet. 2009;52(2-3):128-30. Epub 2009/03/21. doi: 10.1016/j.ejmg.2009.03.002. PubMed PMID: 19298871.
- 17. Rossi E, Piccini F, Zollino M, Neri G, Caselli D, Tenconi R, Castellan C, Carrozzo R, Danesino C, Zuffardi O, Ragusa A, Castiglia L, Galesi O, Greco D, Romano C, Pierluigi M, Perfumo C, Di Rocco M, Faravelli F, Dagna Bricarelli F, Bonaglia M, Bedeschi M, Borgatti R. Cryptic telomeric rearrangements in subjects with mental retardation associated with dysmorphism and congenital malformations. J Med Genet. 2001;38(6):417-20. Epub 2001/06/27. doi: 10.1136/jmg.38.6.417. PubMed PMID: 11424927; PMCID: PMC1734891.
- 18. Koolen DA, Nillesen WM, Versteeg MH, Merkx GF, Knoers NV, Kets M, Vermeer S, van Ravenswaaij CM, de Kovel CG, Brunner HG, Smeets D, de Vries BB, Sistermans EA. Screening for subtelomeric rearrangements in 210 patients with unexplained mental retardation using multiplex ligation dependent probe amplification (MLPA). J Med Genet. 2004;41(12):892-9. Epub 2004/12/14. doi: 10.1136/jmg.2004.023671. PubMed PMID: 15591274; PMCID: PMC1735655.
- 19. Krepischi-Santos AC, Vianna-Morgante AM, Jehee FS, Passos-Bueno MR, Knijnenburg J, Szuhai K, Sloos W, Mazzeu JF, Kok F, Cheroki C, Otto PA, Mingroni-Netto RC, Varela M, Koiffmann C, Kim CA, Bertola DR, Pearson PL, Rosenberg C. Whole-genome array-CGH screening in undiagnosed syndromic patients: old syndromes revisited and new alterations. Cytogenet Genome Res. 2006;115(3-4):254-61. Epub 2006/11/25. doi: 10.1159/000095922. PubMed PMID: 17124408.
- 20. Malt EA, Juhasz K, Frengen A, Wangensteen T, Emilsen NM, Hansen B, Agafonov O, Nilsen HL. Neuropsychiatric phenotype in relation to gene variants in the hemizygous allele in 3q29 deletion carriers: A case series. Mol Genet Genomic Med. 2019;7(9):e889. Epub 2019/07/28. doi: 10.1002/mgg3.889. PubMed PMID: 31347308; PMCID: PMC6732294.
- 21. Shao L, Shaw CA, Lu XY, Sahoo T, Bacino CA, Lalani SR, Stankiewicz P, Yatsenko SA, Li Y, Neill S, Pursley AN, Chinault AC, Patel A, Beaudet AL, Lupski JR, Cheung SW. Identification of chromosome abnormalities in subtelomeric regions by microarray analysis: a study of 5,380 cases. American journal of medical genetics Part A. 2008;146A(17):2242-51.

Epub 2008/07/30. doi: 10.1002/ajmg.a.32399. PubMed PMID: 18663743; PMCID: PMC2680131.

- 22. Murphy MM, Burrell TL, Cubells JF, Epstein MT, Espana R, Gambello MJ, Goines K, Klaiman C, Koh S, Russo RS, Saulnier CA, Walker E, Emory 3q P, Mulle JG. Comprehensive phenotyping of neuropsychiatric traits in a multiplex 3q29 deletion family: a case report. BMC Psychiatry. 2020;20(1):184. Epub 2020/04/24. doi: 10.1186/s12888-020-02598-w. PubMed PMID: 32321479; PMCID: PMC7179007.
- 23. Harner MK, Lichtenstein M, Farrell M, Dietterich TE, Filmyer DM, Bruno LM, Biondi TF, Crowley JJ, Lazaro-Munoz G, Stowe R, Shaughnessy RA, Berg JS, Szatkiewicz J, Sullivan PF, Josiassen RC. Treatment-resistant psychotic symptoms and early-onset dementia: A case report of the 3q29 deletion syndrome. Schizophrenia research. 2020. Epub 2020/09/19. doi: 10.1016/j.schres.2020.08.012. PubMed PMID: 32943312.

Supplemental Tables:

Supplemental Table S1. Summary of study measures by domain

Evaluation

Domain & Measures

Medical

Medical History

- · Patient medical history by organ system
- Family medical history
- Family pedigree

Physical Examination

- Anthropomorphic Measures
- Physical examination by organ system
- Growth parameters (e.g., height, weight, head circumference)

Neurodevelopmental

Autism Spectrum Disorder

- Autism Diagnostic Interview -Revised (ADI-R)
- Autism Diagnostic Observation Schedule, 2nd ed (ADOS-2)

Cognitive Ability & Adaptive Function

- Differential Ability Scales, 2nd ed (DAS-II)^a
- Beery-Buktenica Developmental Test of Visual Motor Integration Test-6th ed (VMI-6)
- Behavioral Rating Inventory of Executive Functions, 2nd ed (BRIEF-2)^a
 and Adult version (BRIEF-A)^b
- Vineland Adaptive Behavior Scales, 3rd ed, Parent/Caregiver Form
- Wechsler Abbreviated Scale of Intelligence, 2nd ed (WASI-II)^b

Psychiatric

Anxiety

- Anxiety Disorders Interview Schedule for DSM –IV (ADIS-IV) Child Version^a
- Structured Clinical Interview for DSM-V --Research Version (SCID-5-RV) Module F^{b, c}

Prodromal Symptoms & Psychosis

- Scheduled Interview for Psychosis-Risk Syndromes (SIPS)
- Structured Clinical Interview for DSM-V --Research Version (SCID-5-RV) Module B/C^b

General Psychopathology

- Kiddie Schedule for Affective Disorders and Schizophrenia (K-SADS)a, c
- Structured Clinical Interview for DSM-V --Research Version (SCID-5-RV) Modules A, D, G, H, I, K^b

Neuroimaging Structural MRI

Neurological Gross and fine motor skill assessment

^a Administered to ages 6-18 years (, ^b administered to ages 19+ years, ^c For some cases ages 19-22 years, the K-SADS was used to assess anxiety and psychopathology.

Supplemental Table S2. Frequency of Symptoms and Diagnoses with Associated Procedure or Intervention (N = 32)

Symptoms/Diagnoses with Associated	Associated HPO	n	%
Procedure or Intervention	Codes		
General		7	22%
Fatigue	HP:0012378	7	22%
HEENT		25	78%
Recurrent Infection addressed with surgery (any)		6	-
Cases requiring tonsillectomy	-	4	_
Cases requiring adenoidectomy	-	5	-
Eye (any)		19	59%
Brown Disease		1	3%
Prematurity Retinopathy	HP:0500049	1	3%
Glasses – unspecified reason	-	3	9%
Hypermetropia	HP:0000540	3	9%
Astigmatism	HP:0000483	5	16%
Myopia	HP:0000545	5	16%
Strabismus	HP:0000486	9	28%
Cases with strabismus requiring surgery		3	_
Ear			
Recurrent ear infection		7	22%
Cases requiring myringotomy and tube			
placement	-	3	-
Nose (any)		8	25%
Deviated Septum (corrected by surgery)	HP:0004411	1	3%
Epistaxis	HP:0000421	7	22%
Cases with epistaxis requiring surgery		2	-
Pharynx (any)		4	13%
Esophageal Dysmotility	HP:0031857	1	3%
Laryngomalacia	HP:0001601		
Cases with laryngomalacia requiring		1	3%
surgery		1	-
Dysphagia	HP:0002015	2	6%
Teeth (any)		13	41%
Malocclusion	HP:0000689	1	3%
Dental Crowding	HP:0000678		
Cases with dental crowding requiring		2	6%
surgery		1	-
Abnormal Number or Size of Teeth (any)	-	5	16%
Microdontia	HP:0000691	2	6%
Hyperdontia	HP:0011069	2	6%
Hypodontia	HP:0009804	1	3%
Abnormal Dentition (any)	-	9	28%
General (e.g., cavities, alignment)	HP:0000164	6	19%
Dental caries	HP:0000670	3	9%
Dental enamel	HP:0000682	1	3%
Cardiovascular		16	50%
Rhythm		3	9%

			7
SVT at Delivery	HP:0004755	1	3%
Syncope	HP:0001279		6%
Cases with syncope diagnosed with		2	
POTS		1	3%
Structural		15	47%
Murmur	HP:0030148	7	22%
Complex congenital cardiovascular disease	-		25%
(any)		8	
Cases requiring surgery		4	-
Abnormal vascular (AVM)	HP:0002597	1	3%
Hypoplastic right heart	HP:0010954	1	3%
Patent ductus arteriosus (PDA)	HP:0011648	2	6%
Pulmonary artery stenosis	HP:0004415	1	3%
Pulmonary atresia artery	HP:0004935	1	3%
Pulmonary atresia valve	HP:0010882	1	3%
Pulmonary valve stenosis	HP:0001642	1	3%
Tricuspid stenosis	HP:0010446	1	3%
Ventral septal defect	HP:0001629	2	6%
Respiratory		8	25%
Frequent Infection	HP:0002205	1	3%
Recurrent Bronchitis	HP:0002837	1	3%
Asthma	HP:0002099	6	19%
Sleep		10	31%
Sleep Apnea	HP:0010535	1	3%
Sleep Disturbance (any)	HP:0002360	10	31%
Difficulty initiating sleep	-	5	16%
Difficulty maintaining sleep	-	6	19%
Sleep walking	HP:0025236	1	3%
Gastrointestinal		26	81%
Nausea	HP:0002018	1	3%
Redundant Colon	-	1	3%
Abdominal Pain (any)	-	2	6%
General abdominal pain	HP:0002027	1	3%
Episodic abdominal pain	HP:0002574	1	3%
Failure to Thrive in Infancy	HP:0001531	3	9%
Feeding Problems Beyond Infancy	HP:0011968	5	16%
			, .
Cases requiring feeding tube placement		3	_
Constipation	HP:0002019	13	41%
Failure to Thrive Beyond Infancy	HP:0001508	13	41%
Reflux	HP:0002020	16	50%
Feeding Problems in Infancy (e.g., poor	HP:0008872		
latch, restrictive food preferences)		19	59%
Renal/Genitourinary		9	28%
Renal Tubular Acidosis (RTA)	HP:0000787	1	3%
Vesicoureteral Reflux (VUR) with recurrent	HP:0000076	<u>'</u>	J /0
urinary tract infections (UTI)	111 .0000070	1 1	3%
		2	10%
Abnormal Penis (males only, any)	_	2	-
, who make the control of the contro			

Cases with abnormal penis requiring			
surgery			
Cryptorchidism	HP:0000028	1	5%
Hooded prepuce	HP:0000036	1	5%
Hypospadias	HP:0003244	2	10%
Enuresis (any)	-	7	22%
General	HP:0000805	8	25%
Nocturnal	HP:0010677	2	6%
Endocrine	111 100 1007 1	9	28%
History of High Prolactin	-	1	3%
Obesity secondary to medication	_	1	3%
Polydipsia	HP:0001959	1	3%
Polyphagia or Hyperphagia	HP:0002591	1	3%
Weight Gain	HP:0004324	1	3%
Hypothyroidism	HP:0000821	3	9%
Short Stature	HP:0004322	3	9%
Hematologic	111 :0004322	4	13%
Bruising	HP:0000978	2	6%
Anemia (e.g., megaloblastic, secondary to	HP:0001903		0 /6
epistaxis)	111 :000 1903	2	6%
Musculoskeletal (any)		8	25%
Abnormal Thumb Phalanx	HP:0009602	1	3%
Limb Pain	HP:0009002	1	3%
Vertebral Fusion	HP:0009703	1	3%
Joint Laxity	HP:0002948	2	6%
Joint Pain	HP:0001388	2	6%
Joint Stiffness	HP:0002829	3	9%
Dermatologic	ПР.0001370	 11	34%
	LIDIOOOSEEO	1	3%
Accessory Nipple Livedo Reticularis	HP:0002558		
	HP:0000965	1	3%
Striae Distensae	HP:0001065	1	3%
Vitiligo	HP:0001045	1	3%
Eczema Control Billaria	HP:0000964	4	13%
Keratosis Pilaris	HP:0032152	4	13%
Allergy/immunology		9	28%
Allergies	110.044.0000	4	00/
Drug Allergy	HP:0410323	1	3%
Food Allergy	HP:0500093	4	13%
Seasonal Allergies	HP:0012395	5	16%
Deficiencies			00/
IGA Deficiency	HP:0002720	1	3%
IGG Deficiency	HP:0004315	1	3%
Neurological (any)		18	56%
Abnormal Pain Sensation (e.g., does not	HP:0010832	_	
feel pain)		1	3%
Abnormal Muscle Bulk	HP:0030236	1	3%
Tremors	HP:0001337	1	3%
Generalized Hypotonia	HP:0001290	2	6%
Tics or Movement Disorder	HP:0100033	2	6%

Seizures (any)	-	4	13%
Atonic	HP:0010819	1	3%
Febrile	HP:0002373	2	6%
Nocturnal	HP:0031951	1	3%
Unspecified	-	1	3%
Headache	HP:0002315	5	16%

Supplemental Table S3. Frequency of Physical Findings

Finding Associated HPO			%
G	Codes		
Cardiovascular (any)		2	6%
Murmur (any)	-	2	6%
General	HP:0030148	1	3%
Systolic	HP:0031664	1	3%
Musculoskeletal (any)		27	84%
Axial (any)		15	47%
Long Neck	HP:0000472	2	6%
Scoliosis	HP:0002650	2	6%
Chest Deformities (any)	-	13	41%
Asymmetric Chest	HP:0001555	2	6%
Pectus Carinatum	HP:0000768	3	9%
Pectus Excavatum	HP:0000767	8	25%
Extremity – Upper (any)		15	47%
Fetal Fingertip Pads	HP:0001212	1	3%
Prominent Interphalangeal Epiphyses	HP:0010231	1	3%
Ulnar Deviation	HP:0009465	1	3%
Short Finger	HP:0009237	2	6%
Abnormal Palmar Crease (any)	-	3	9%
General	HP:0010490	2	6%
Single transverse	HP:0000954	1	3%
Tapered Finger	HP:0001182	4	13%
Long, Thin Finger (any)	-	8	25%
Long fingers	HP:0100807	4	13%
Thin fingers	HP:0001238	3	9%
Extremity – Lower (any)		23	72%
Genu Recurvatum	HP:0002816	1	3%
Small Feet	HP:0001773	1	3%
Leg Asymmetry	HP:0100559	2	6%
Long Toe	HP:0010511	2	6%
Abnormal Toes (any)	-	9	28%
Big hallux	HP:0001844	1	3%
Broad hallux	HP:0010055	1	3%
Broad hallux phalanx	HP:0010059	1	3%
Hallux valgus	HP:0001822	1	3%
Overlapping toes	HP:0001845	2	6%
Short phalanx of 2 nd toe	HP:0010431	1	3%
Laterally curved 2 nd toe	HP:0010319	2	6%
Medially curved 3 rd toe	HP:0010320	2	6%
Curved 4 th toe	HP:0010321	1	3%
Medial Rotation Medial Malleolus	HP:0008132	10	31%
Pes Planus	HP:0001763	10	31%
Dermatologic (any)		11	34%
Abnormal Fingernail	HP:0001597	1	3%
Axillary Freckling	HP:0000997	1	3%

Epidermal Nevus	HP:0010816	1	3%
Hyperpigmented Papule	HP:0025473	1	3%
Inguinal Freckling	HP:0030052	1	3%
Livedo Reticularis	HP:0000965	1	3%
Vitiligo	HP:0001045	1	3%
Abnormal Toenail (any)	-	2	6%
Hypoplastic	HP:0001800	1	3%
Dystrophic	HP:0001810	1	3%
Café-au-lait Macules	HP:0000957	2	6%
Dermal Translucency	HP:0010648	2	6%
Nevi or Macule (any)	-	3	9%
Hyper melanotic macule	HP:0001034	1	3%
Macule	HP:0012733	1	3%
Nevi	HP:0001054	1	3%
Neuro (any)		9	28%
General (any)		3	9%
Speech articulation difficulty	HP:0009088	1	3%
Hyperreflexia	HP:0001347	2	6%
Muscle (any)		3	9%
Abnormality of muscle size (decreased	HP:0030236		
muscle bulk)		1	3%
Hypotonia	HP:0001276	1	3%
Hypertonicity	HP:0001290	1	3%

Note. Numbers in bold face type represent a count of *any* instance in the category for each case (total possible = 32).

Supplemental Table S4: Findings from T1- and T2-weighted MRI scans in N=24 patients with 3q29-deletion syndrome.

Participant	Demographic information	Posterior fossa structure	Abnormality
1	4 y/o, white (non-Hispanic) male	Normal	
2	6 y/o, white (non-Hispanic) male	Abnormal	Global cerebellar hypoplasia
3	6 y/o, white (non-Hispanic) male	Abnormal	Subtle cerebellar hemispheric hypoplasia
4	6 y/o, white (non-Hispanic) female	Abnormal	Retrocerebellar arachnoid cyst
5	6 y/o, white (non-Hispanic) female	Abnormal	Retrocerebellar arachnoid cyst
6	7 y/o, white (non-Hispanic) male	Abnormal	Cerebellar vermis hypoplasia
7	8 y/o, white (non-Hispanic) male	Normal	
8	8 y/o, white (non-Hispanic) male	Normal	
9	9 y/o, white (non-Hispanic) female	Normal	
10	10 y/o, white (non-Hispanic) male	Abnormal	Cerebellar vermis hypoplasia
11	10 y/o, more than one race (non-Hispanic) female	Abnormal	Retrocerebellar arachnoid cyst

12	12 y/o, more than one race (non-Hispanic) male	Abnormal	Cerebellar hemispheric hypoplasia
13	14 y/o, white (non-Hispanic) male	Abnormal	Cerebellar hemispheric hypoplasia
14	15 y/o, white (non-Hispanic) female	Normal	
15	15 y/o, white (non-Hispanic) male	Abnormal	Retrocerebellar arachnoid cyst, Cerebellar hemispheric hypoplasia
16	16 y/o, white (non-Hispanic) male	Normal	
17	17 y/o, white (non-Hispanic) male	Abnormal	Cerebellar vermis hypoplasia
18	18 y/o, white (Hispanic) male	Abnormal	Retrocerebellar arachnoid cyst, Cerebellar vermis hypoplasia
19	21 y/o, white (non-Hispanic) female	Abnormal	Retrocerebellar arachnoid cyst, Cerebellar hemispheric hypoplasia
20	21 y/o, white (non-Hispanic) female	Abnormal	Retrocerebellar arachnoid cyst, Subtle cerebellar vermis hypoplasia
21	24 y/o, white (non-Hispanic) male	Abnormal	Cerebellar vermis hypoplasia
22	27 y/o, white (non-Hispanic) female	Abnormal	Subtle cerebellar vermis hypoplasia
23	34 y/o, white (non-Hispanic) female	Abnormal	Cerebellar vermis hypoplasia, Cerebellar hemispheric hypoplasia

24 39 y/o, white (non-Hispanic) Normal male

Supplemental Table S5: Demographic characteristics of patients with abnormal (left) and normal (right) posterior fossa structure.

•	Participants with an abnormal posterior fossa finding (<i>N</i> = 17; 70.8%)	
Sex		Sex
Male	10 (41.7%)	Male
Female	7 (29.2%)	Female
Age		Age
Mean (SD)	14.9 (8.4) years	Mean (SD)
Median	14 years	Median
Range	6 – 34 years	Range
Ethnicity		Ethnicity
Non-Hispanic	16 (66.7%)	Non-Hispanic
Hispanic	1 (4.2%)	
Race		Race
White	15 (62.5%)	White
More than one race	2 (8.3%)	

Participants with a normal posterior fossa finding (N = 7; 29.2%)				
Sex				
Male	5 (20.8%)			
Female	2 (8.3%)			
Age				
Mean (SD)	14.1 (11.7) years			
Median	9 years			
Range	4 – 39 years			
Ethnicity				
Non-Hispanic	7 (29.2%)			
Race				
White	7 (29.2%)			

Table S6: Results of Neurological Exam for 23 individuals with 3q29 deletion syndrome

	Fine Finger Movement	Rapid Alternating Movement	Heel to Shin Task	Finger to Nose Task	Tandem Walk
normal/score 0 (%)	6 (26%)	4 (17%)	6 (32%)	14 (61%)	11 (55%)
Mild/score 1 (%)	9 (39%)	7 (30%)	9 (47%)	8 (35%)	6 (30%)
moderate/score 2 (%)	8 (35%)	11 (48%)	4 (21%)	1 (4%)	3 (15%)
severe/score 3 (%)	0 (0%)	1 (4%)	0 (0%)	0 (0%)	0 (0%)
not normal (%)	17 (74%)	19 (83%)	13 (68%)	9 (39%)	9 (45%)

Medical History (~25 minutes)

These questions ask about your child's medical history. Please do your best to answer all applicable questions. Overall, these questions will take about 20-30 minutes to complete.

You can save and return to these questions at any time by clicking the Save and Return button at the bottom of the survey. Unsaved responses will have to be re-entered.

For questions, please email melissa.murphy@emory.edu or call (404) 727-3446. Thank you! Name of person completing this survey: Relation to person with 3q29 biological parent step-parent grandparent ○ self other Please describe your relation to the person with 3q29 Please answer the following questions in reference to the person with 3q29. When did you or your primary care provider first suspect a problem? What current questions or concerns do you have about your child? Is your child adopted? Yes ○ No Pregnancy History (for the pregnancy of the person with 3q29) Mother's age at delivery? Father's age at delivery? O blood test The pregnancy was confirmed by: urine test At how many weeks was the pregnancy confirmed? ○ 1st What number pregnancy was this for the mother? O 2nd 3rd O 4th → 5th Other



When did the mother begin prenatal ca	re?	1st trimester2nd trimester3rd trimesterNo prenatal care	
Please answer the following Yes detail below.	s/No questions	about the pregnancy. If y	es, please provide
1. Prenatal vitamins?	Yes	No	Don't Know
Medications (prescription)?	0	0	0
3. Medications (prescription): (over-the-counter)?	0	0	0
4. Smoking?	\bigcirc	\circ	\circ
5. Alcohol (beer, liquor, wine)?	\bigcirc	\circ	\bigcirc
6. Street drugs?	\bigcirc	\circ	\bigcirc
7. Illness/infection?	\bigcirc	\circ	\bigcirc
8. Bleeding?	\bigcirc	0	\bigcirc
9. Rash?	\bigcirc	\circ	\bigcirc
10. Fever?	\bigcirc	\circ	\bigcirc
11. Diabetes?	\bigcirc	\circ	\bigcirc
12. High blood pressure?	\bigcirc	\circ	\bigcirc
13. Thyroid problems?	\bigcirc	\circ	\bigcirc
14. X-rays/radiation?	\circ	\circ	\bigcirc
15. Premature labor?	\bigcirc	\circ	\bigcirc
16. Hospitalization (do not count the delivery/birth)?	0	0	0
17. Abnormal growth of baby?	\bigcirc	\circ	\bigcirc
18. Other concerns?	0	0	0
Please provide details regarding prenat	al vitamins:		
Please provide details regarding presci medications during pregnancy:	ption		
Please provide details regarding over-ti medications during pregnancy:	he-counter		
Please provide details regarding smoking pregnancy:	ng during		
Please provide details regarding alcoholiquor, wine) consumption during pregn			



Please provide details regarding street drug usage during pregnancy:	
Please provide details regarding illness/infection during pregnancy:	,
Please provide details regarding bleeding during pregnancy:	,
Please provide details regarding rash during pregnancy:	
Please provide details regarding fever during pregnancy:	
Please provide details regarding diabetes during pregnancy:	
Please provide details regarding high blood pressure during pregnancy:	,
Please provide details regarding thyroid problems during pregnancy:	
Please provide details regarding X-rays/radiation during pregnancy:	
Please provide details regarding premature labor:	
Please provide details regarding hospitalizations during pregnancy (do not count the delivery/birth):	
Please provide details regarding abnormal growth of baby:	
Please provide details regarding other concerns:	

Please answer the following Ye	s/No questions re	egarding testing that m	ay have been done
during the pregnancy.			
Screening			
First Trimester Screen (ultrasound of baby's neck/Nucal Translucency/NT measurement plus blood work)	Yes	No	Don't Know
Second Trimester Screen (Triple Screen, Quad Screen, AFP Test)	0	0	0
Diagnostic Testing			
	Yes	No	Don't Know
Chronic Villus Sampling (CVS)	\circ	\circ	\circ
Amniocentesis	0	0	0
Other			
	Yes	No	Don't know
Glucose Tolerance Test	\circ	0	\circ
Routine Ultrasound	\bigcirc	\bigcirc	\bigcirc
Specialized Ultrasound	\circ	\circ	\bigcirc
Other testing	0	0	0
Please explain other testing that may haduring the pregnancy:	nave been done		
Were any of the screening, diagnostic, ABNORMAL? If YES, please explain:	or other tests		
At how many weeks were the baby's fit felt?	rst movements		
Were the baby's movements normal do pregnancy?	uring the	○ Yes ○ No	
Mother's total weight gain during pregi pounds):	nancy (in		

Birth History (for the person with 3q29)	
Due date:	
	
Date delivered:	
	
The child was born:	○ Early
	On time
	○ Late
By how many weeks?	
	
Birth hospital (if not in GA, please include the	
state):	
Was the labor:	 Spontaneous (happened on its own)
	○ Induced
Please explain the reason for the induced birth and	
the method used (i.e. doctor broke your water,	
pitocin, etc.) if known:	
How was the child delivered?	○ Vaginal
	○ C-section
Please explain the reason why a C-section was	
performed (i.e. previous child born that way, failure to progress, etc.):	
Tunure to progress, etc.).	
Was the baby born head first?	○ Yes
	NoI don't know
Baby's weight (in pounds):	
Baby's length (inches):	
Baby's head size (inches):	
	
Were there complications with the delivery?	○ Yes
	○ No
Please list complications with the delivery:	
Were there any problems right after birth (i.e. need to go to the NICU, breathing problems, jaundice,	○ Yes ○ No
etc.)?	<i></i>

Please describe problems right after birth:	
Did the helps have any facility difficulties?	O Van
Did the baby have any feeding difficulties?	
Please describe any feeding difficulties:	
Was your child born with any birth defects? (i.e. club foot, cleft lip and/or cleft palate, heart defects, extra fingers, etc.)?	○ Yes ○ No
Please describe birth defects:	
After the baby was born, how did he/she feed?	BreastBottleOther
Please describe how he/she fed:	
At how many days was your baby discharged home?	
	
Past Medical History (for the person with 3q	29)
	ns about possible tests/procedures/etc. that your
the box below (When? Why? Where? Results	e of these things, please provide more detail in
the box below (which: why: whiere: Results	·=).
General	
	es No
Had a formal eye examination with ophthalmology?	
Had a formal hearing examination?	
Been hospitalized overnight?	\circ
Had surgery?	\circ
Currently taking any	\circ
medications? Been tested for allergies?	0
Immunizations up to date?	
Please comment on the formal eye examination your child had:	

Please comment on the formal hearing child had:	g examination your	
Please comment on the overnight hos child had:	oital stay your	
Please comment on the surgery your o	:hild had:	
Please comment on the medications y currently taking:	our child is	
Please comment on the allergy test(s)	your child had:	
Please comment on your child's immu	nization history:	
Genetic		
Ever had genetic testing?	○ Yes ○ No	
Please comment on the genetic testing	y your child had:	
Imaging		
Had an MRI of the brain? Had an MRI of the kidney? Had an MRI of the heart?	Yes O O	No O O
Had a CT scan of the brain? Had a CT of the kidney?	0	0
Had a CT of the heart?	0	0
Had an ultrasound of the brain?	0	0
Had an ultrasound of the kidney? Had an ultrasound of the heart (echocardiogram)?	0	0
Had an X-ray of the brain? Had an X-ray of the kidney?	O O	0

Had an X-ray of the heart?	\circ	\circ
Had any other special procedures (i.e. EEG, swallow study, etc.)?	0	0
Please comment on the MRI of the brain your of had:	child	
Please comment on the MRI of the kidney you had:	r child	
Please comment on the MRI of the heart your had:	child	
Please comment on the CT scan of the brain y had:	our child	
Please comment on the CT scan of the kidney child had:	your	
Please comment on the CT scan of the heart y had:	our child	
Please comment on the ultrasound of the brain child had:	n your	
Please comment on the ultrasound of the kidn child had:	ey your	
Please comment on the ultrasound of the hear (echocardiogram) your child had:	t	
Please comment on the X-ray of the brain you had:	r child	
Please comment on the X-ray of the kidney yo had:	ur child	
Please comment on the X-ray of the heart you had:	r child	
Please comment on any other special procedu EEG, swallow study, etc.) that your child has h		



Does your child have any significant pr	roblems with a	ny of the following?
	Yes	No
Unusual weight gain or loss	0	0
Eye/vision	0	0
Hearing	0	0
Ears/Nose/Mouth/Throat	0	0
Teeth	0	0
Lungs/Breathing	\circ	\circ
Heart/Veins/Arteries/Circulation	\circ	0
Stomach/Intestines/Bowels	\circ	0
Kidney/Bladder/Genitals	\circ	0
Bones/Muscles (pain, weakness, abnormalities, etc.)	0	\bigcirc
Joint pains/Swelling/Stiffness	\bigcirc	\circ
Skin/Hair/Nails	\bigcirc	\circ
Easy bruising/Bleeding or poor wound healing	0	0
Headaches/Seizures	\bigcirc	\circ
Loss of balance or coordination	\circ	0
Loss of developmental skills	\bigcirc	\circ
Sleep disturbances/Problems	\bigcirc	\circ
Behavior/Psychological Problems	\circ	\circ
Growth	\circ	\circ
Heat or cold intolerance	\circ	\circ
Delays or problems with puberty	\circ	\circ
Hormones	\circ	\circ
Other	0	0
Please describe any significant problems with your child's unusual weight gain or loss:	our	
Please describe any significant problems with ye child's eyes/vision:	our	
Please describe any significant problems with ye child's hearing:	our	
Please describe any significant problems with ye child's ears/nose/mouth/throat:	our	
Please describe any significant problems with ye child's teeth:	our .	

Please describe any significant problems with your child's lungs/breathing:	
Please describe any significant problems with your child's heart/veins/arteries/circulation:	
Please describe any significant problems with your child's stomach/intestines/bowels:	
Please describe any significant problems with your child's kidney/bladder/genitals:	
Please describe any significant problems with your child's bones/muscles (pain, weakness, abnormalities, etc.):	
Please describe any significant problems with your child's joint pain/swelling/stiffness:	
Please describe any significant problems with your child's skin/hair/nails:	
Please describe any significant problems with your child's easy bruising/bleeding or poor wound healing:	
Please describe any significant problems with your child's headaches/seizures:	
Please describe any significant problems with your child's loss of balance or coordination:	
Please describe any significant problems with your child's loss of developmental skills:	
Please describe any significant problems with your child's behavioral/psychological problems:	
Please describe any significant problems with your child's sleep disturbances/problems:	
Please describe any significant problems with your child's growth:	



Please describe any significant pr child's heat or cold intolerance:	oblems with your			
Please describe any significant pr child's delays or problems with pu				
Please describe any significant pr child's hormones:	oblems with your			
Diet/Feeding History				
Please describe any other signific	ant problems:			
Please describe any past problem diet or feeding:	s with your child's			
Please describe any current probl child's diet or feeding:	ems with your			
Parental Height				
Biological father's height:				-
Biological mother's height:				_
Handedness For each immediate biologic preference:				
	right hand dominant	left hand dominant	uses both hands equally (ambidextrous)	unknown
Person with 3q29	\bigcirc	\circ	\bigcirc	\bigcirc
Biological Mother	\bigcirc	\circ	\bigcirc	\circ
Biological Father	\bigcirc	\circ	\bigcirc	\bigcirc
Sibling 1	\bigcirc	\circ	\bigcirc	\bigcirc
Sibling 2	\circ	0	\circ	0
Does the child have more than 2	siblings?	○ Yes ○ No		
Please list each additional sibling handedness.	and his/her			



Early Development		
WHEN did you or your doctor first become concerned about your child's development?		
If there were any concerns about your child's development, HOW were these concerns noticed?		
Pediatrician/Primary Care Physician		
*If your child has changed pediatrician/primary care provider.	provider, please list the most rece	ent
What is the name of your pediatrician/primary care physician?		
If you haven't already, are you willing to sign a release to allow us to contact this provider to request medical records?	YesNo	
Practice name:		
Practice address:		
Practice phone number:		
Practice fax:		
Other than a pediatrician/primary care physician, when the state of th	nat doctors is your child ACTIVELY	seeing?
Name of Doctor 1		
Specialty (i.e. neurology, cardiology, GI, etc.)		
Reason your child is seen		
How often child sees this doctor (i.e. once a year, every 3 months, etc.)		
Practice name:		
Practice address:		



Practice phone number:		
Enter other doctor	○ Yes ○ No	
Name of Doctor 2		
Specialty (i.e. neurology, cardiology, GI, etc.)		
Reason your child is seen		
How often child sees this doctor (i.e. once a year, every 3 months, etc.)		
Practice name:		
Practice address:		
Practice phone number:		
Enter other doctor	○ Yes ○ No	
Name of Doctor 3		
Specialty (i.e. neurology, cardiology, GI, etc.)		
Reason your child is seen		
How often your child sees this doctor (i.e. once a year, every 3 months, etc.)		
Practice name:		
Practice address:		
Practice phone number:		
Enter other doctor		



Name of Doctor 4		_
Specialty (i.e. neurology, cardiology, GI, etc.)		-
Reason your child was seen		-
How often child sees this doctor (i.e. once a year, every 3 months, etc.)		-
Practice name:		-
Practice address:		_
Practice phone number:		_
Enter other doctor	○ Yes ○ No	
Please list other doctors your child is ACTIVELY seeing (include specialty, frequency, and contact information):		
Other than a pediatrician/primary care physician, PAST?	what doctors has your child se	een IN THE
Name of Doctor 1		-
Specialty (i.e. neurology, cardiology, GI, etc.)		-
Reason your child was seen		-
Date of last visit with this specialist		-
Enter other doctor	○ Yes ○ No	
Name of Doctor 2		-
Specialty (i.e. neurology, cardiology, GI, etc.)		_
Reason your child was seen		



Date of last visit with this specialist		-
Enter other doctor	Yes No	
Name of Doctor 3		-
Specialty (i.e. neurology, cardiology, GI, etc.)		-
Reason your child was seen		-
Date of last visit with this specialist		-
Enter other doctor	○ Yes ○ No	
Name of Doctor 4		-
Speciality (i.e. neurology, cardiology, GI, etc.)		-
Reason your child was seen		-
Date of last visit with this specialist		-
Enter other doctor	○ Yes ○ No	
Please describe other doctors your child has seen in the PAST (include specialty and frequency):		
How old was your child when he/she began:		
Rolling over?		-
Sitting alone?		-
Pulling to stand?		-
Crawling?		-



Cruising?				
Walking alone?				
First word?				
First sentences?				
Toilet trained?				
Has your child lost any skills that he/she prev mastered (regression)?	iously	○ Yes ○ No		
Please describe any regression:				
School Information				
Does your child currently attend school or day	y care?			
What is the name of the school/daycare?				
Grade (if applicable)?				
Does your child attend special classes or need special help?	d	○ Yes ○ No		
Please describe special classes your child atte special help he/she needs (For example, what subjects does he/she need help in? Is he/she inclusion class or self-contained class?):	t			
If not already provided, please upload a copy child's most recent IEP (if possible):	of your			
Does your child receive any of the following?				
Physical thorasy	Yes		No	
Physical therapy	0		0	
Occupational therapy	0		0	
Speech therapy	0		\circ	

Other therapy	O	O
How often does your child receive physical therapy?		
How often does your child receive occupational therapy?		
How often does your child receive speech therapy?		
Please list other therapy your child receives and how often:	N	
Does your child have any behavioral problems?	○ Yes ○ No	
Please describe any behavioral problems:		
Do you feel that your child's language skills are where they should be for your child's age?	○ Yes ○ No	
Please describe your child's language skills for his/her age:		
Has your child ever had IQ testing or a formal developmental assessment?	○ Yes ○ No	
When did your child receive IQ testing or a formal development assessment? And what were the result	ts? 	
If not already provided, please upload a copy of the		

If not already provided, please upload a copy of the results from the most recent evaluation (if possible):

